



UNITED STATES PATENT AND TRADEMARK OFFICE

UNITED STATES DEPARTMENT OF COMMERCE
United States Patent and Trademark Office
Address: COMMISSIONER FOR PATENTS
P.O. Box 1450
Alexandria, Virginia 22313-1450
www.uspto.gov

APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/814,627	04/01/2004	Kan Yasui	XA-10076	7588
181	7590	04/20/2006	EXAMINER	
MILES & STOCKBRIDGE PC 1751 PINNACLE DRIVE SUITE 500 MCLEAN, VA 22102-3833			THOMAS, TONIAE M	
			ART UNIT	PAPER NUMBER
			2822	

DATE MAILED: 04/20/2006

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary

Application No.

10/814,627

Applicant(s)

YASUI ET AL.

Examiner

Toniae M. Thomas

Art Unit

2822

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 27 January 2006.
- 2a) ☒ This action is **FINAL**. 2b) ☐ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-9 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 1-9 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 01 April 2004 is/are: a) ☒ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☒ All b) ☐ Some * c) ☐ None of:
- 1) ☒ Certified copies of the priority documents have been received.
 - 2) ☐ Certified copies of the priority documents have been received in Application No. _____.
 - 3) ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
- * See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- | | |
|--|---|
| 1) <input type="checkbox"/> Notice of References Cited (PTO-892) | 4) <input type="checkbox"/> Interview Summary (PTO-413)
Paper No(s)/Mail Date. _____ |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948) | 5) <input type="checkbox"/> Notice of Informal Patent Application (PTO-152) |
| 3) <input type="checkbox"/> Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)
Paper No(s)/Mail Date _____ | 6) <input type="checkbox"/> Other: _____ |

DETAILED ACTION

1. This Office action is responsive to the amendment filed on 27 January 2006. Currently, claims 1-9 are pending.

Claim Rejections - 35 USC § 112

The following is a quotation of the first paragraph of 35 U.S.C. 112:

The specification shall contain a written description of the invention, and of the manner and process of making and using it, in such full, clear, concise, and exact terms as to enable any person skilled in the art to which it pertains, or with which it is most nearly connected, to make and use the same and shall set forth the best mode contemplated by the inventor of carrying out his invention.

2. *Claims 1-9 are rejected under 35 U.S.C. 112, first paragraph, as failing to comply with the written description requirement.* The claims contain subject matter that was not described in the specification in such a way as to reasonably convey to one skilled in the relevant art that the inventors, at the time the application was filed, had possession of the claimed invention. Claims 1 and 2 as presented in the amendment filed on 27 January 2006 recite the limitation "converting only a part of a surface of the silicon nitride film into a non-silicon-nitride type insulator film." However, the disclosure as originally filed does not provide support for this limitation. Instead, the disclosure as originally filed provides support for converting an entire portion of a silicon nitride film into a non-silicon-nitride type insulator film. Figure 8 of the originally filed drawings clearly shows that an entire portion of the silicon nitride film 14 is converted into a non-silicon-nitride type insulator film 14a, not only part of a surface of the silicon nitride film as recited in amended

claims 1 and 2 (see page 17, lines 5-10). Therefore, since the originally filed disclosure does not provide support for the recited limitation, it is required that the limitation be deleted from the claims.

Claim Rejections - 35 USC § 102

The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

3. *Claim 1 is rejected under 35 U.S.C. 102(b) as being anticipated by Ahn et al. (US 2002/0168873 A1).*

The Ahn et al. application publication (Ahn '873) discloses a semiconductor device manufacturing method (figs. 11-13 and accompanying text). The method comprises the steps of: forming a trench by etching a silicon substrate 10 (fig. 11 and par. 46, lines 1-2); forming a silicon nitride film 47 along an inner wall of the trench (fig. 11 and par. 46, lines 3-5); and converting only a part of a surface of the silicon nitride film 47 to a non-silicon-nitride type insulator film, silicon oxide layer 472 (par. 50, lines 6-10).¹

¹ An oxidizing process converts part of the surface of the silicon nitride film 47 into a silicon oxide film (par. 50, lines 6-10), whereas a part of the surface of the silicon nitride layer represented by reference numeral 471 is not converted (par. 50, lines 10-11).

Allowable Subject Matter

4. Claims 2-9 are rejected in this Office action under 35 USC 112, first paragraph, only. However, the subject matter of claims 2-9 is allowable over the prior art of record for reasons as follows. It is known to form a semiconductor device, wherein the method comprises the steps of: forming a trench by etching a silicon substrate, the trench having a silicon nitride film formed along an inner wall thereof; and converting only a part of a surface of the silicon nitride film into a non-silicon-nitride type insulator film, as evidenced by Ahn '873 (see figs. 11-13 and accompanying text as applied above to claim 1. It is also known to form a semiconductor device, wherein the method comprises forming a first embedded insulator film inside a trench such that the first embedded insulator film does not completely fill the trench, and forming a second embedded insulator film 139 on the first embedded insulator film such that the trench is filled with the first and second embedded insulator films, as evidenced by Ahn (2002/0072198 A1 - see figs. 6-10 and accompanying text). However, the prior art of record does not anticipate, teach or suggest a method of forming a semiconductor device substantially as claimed, the method comprising: forming a first embedded insulator film inside a trench, the trench having a silicon nitride film formed along an inner wall thereof; and converting only a part of a surface of the silicon nitride film into a non-silicon-nitride type insulator film, wherein the converted part of the

Art Unit: 2822

surface of the silicon nitride film is exposed from the first embedded insulator film.

Please note, if claim 2 is amended so as to be in compliance with 35 USC 112, first paragraph, then claims 2-9 would be rejected under 35 USC 103(a) as being unpatentable over Ahn et al. (US 2002/0168873 A1) in view of Ahn (US 2002/0072198 A1).

Response to Arguments

5. Applicants' arguments filed on 27 January 2006 with respect to claim 1 have been fully considered, but are not persuasive.

In the remarks submitted on 27 January 2006, Applicants argue the following:

Ahn does not disclose any mechanism by which to oxidize only a part of a surface of silicon nitride liner 47.

As explained above with respect to claim 1, Ahn discloses forming a silicon nitride film 47 along an inner wall of a trench (fig. 11 and par. 46, lines 3-5); and converting only a part of a surface of the silicon nitride film 47 to a non-silicon-nitride type insulator film, silicon oxide layer 472 (par. 50, lines 6-10). An oxidizing process converts part of the surface of the silicon nitride film 47 into a silicon oxide film (par. 50, lines 6-10), whereas a part of the surface of the silicon nitride film represented by reference numeral 471 is not converted (par. 50, lines 10-11). Therefore, Ahn does disclose a mechanism by which to oxide only a part of a surface of the silicon nitride line 47.

Conclusion

6. Applicant's amendment necessitated the new ground of rejection presented in this Office action. Accordingly, **THIS ACTION IS MADE FINAL**. See MPEP § 706.07(a). Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire **THREE MONTHS** from the mailing date of this action. In the event a first reply is filed within **TWO MONTHS** of the mailing date of this final action and the advisory action is not mailed until after the end of the **THREE-MONTH** shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than **SIX MONTHS** from the date of this final action.

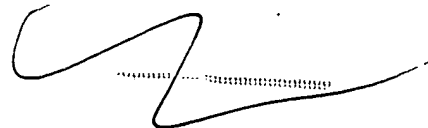
Any inquiry concerning this communication or earlier communications from the examiner should be directed to Toniae M. Thomas whose telephone number is (571) 272-1846. The examiner can normally be reached on Monday through Friday from 8:30 a.m. to 5:30 p.m.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Zandra Smith can be reached on (571) 272-2429. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Art Unit: 2822

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

TMT
15 April 2006

A handwritten signature in black ink, appearing to read 'Mary Wilczewski', with a stylized flourish at the end.

Mary Wilczewski
Primary Examiner